SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1408.—Vol. XXXII.] LONDON, SATURDAY, AUGUST 16, 1862. [WITH JOURNAL] STAMPED.... SIXPENCE. UNSTAMPED. FIVEPENCE.

E INTERNATIONAL EXHIBITION—1862.

LASS VIII.—MACHINERY IN GENERAL. AWARDS—MEDALS.

arrison, and Co.—Gun-metal fittings for steam-engine, valve fixed with fusible
Good work, general excellence. [ment, practical success, good work.
, Sir W. G., and Co.—Water-pressure engine, crane, &c. General arrange-
F. P.—Steam-engine and hoist. Practical success.
J. U.—Chain pump. Originality of design, good arrangement.
and Cameron—Derrick crane. Practical utility, moderate cost.
ction Engine Company—Traction engine. Practical utility and success.
e Copper Company—Copper and brass work, valves, &c.
Marshall, and Co.—Steam engines, steam pump, cranes, &c. General good
ment and good workmanship.
and Co.—Steam crane. Good workmanship, practical utility.
J.—Glass rollers, pumps, pipes, &c., turned and bored. New manufacture,
[venience.
rk.
L.—Smoke consumer and feed-water heater. Practical efficiency and con-
—Fire-escape. Good design, practical utility, good workmanship.
Shuttleworth, and Co.—Steam-engine. Good arrangement, good workman-
and Spencer—Iron tubes. Good work. [ship, and practical success.
Ames, and Sons—Turbine, Appold's centrifugal pump. Good workmanship,
ful success.
G. J., and Son—Leather bands, hose, and fire-buckets. Good work.
Preston, and Co.—Steam-engine and sugar-mill. General excellence.
and Barr—Derrick crane. Practical utility. Good workmanship.
Col. F., R.E.—As inventor of fire-engine well adapted for military purposes.
and Gathercole—Salinometers, telegraphs, indicators, &c. Good workmanship.
and, Bailey, and Co.—Machine for testing strength of steel. Good design, ex-
workmanship, practical success. [work and practical success.
and Co.—Double acting centifugal pump, worked by horizontal engines. Good
J.—Cast-iron boiler. Originality of design, and general merit.
and Co.—Model of pumping-engine. Excellence and practical success of en-
represented by the model. [all parts, and good workmanship.
rs and Tennant—Marine engines. Simplicity, compactness, accessibility of
Iron Tube Company.—Metal tubes. Good work. [manship.
Sons, and Co.—Marine engines. Compactness, good arrangement, good work-
T., and Sons—Joplin's water meter, sluice valves, &c. Good arrangement,
Company—Blast engines. Good work. [practical utility.
—Blowing fan. Good design, practical utility. [tical success.
r Water Meter Company—Water meters. Originality of design and prac-
, Sons, and Field—Marine engines and models. General excellence of the en-
in the collection of working models.
T. and A.—30-horse power steam-engine and sugar-mill in motion. General
ign, and good workmanship. [and performance.
ther and Son—Fire-engines. Improvements in design, good workmanship
and Tait—Steam-engine and sugar-mill in motion. General excellence, good
and good workmanship.
T.—Murray's chain pump. Practical success.
R. and Co.—Inverted cylinder vertical engines. Compactness and simplicity.
, and Son—Centrifugal machine for curing sugar, automaton mint weighing-
. Originality of design, excellent workmanship, and practical success of
e-machine, originality of design, and good work in sugar-machine.
, and Sons—Drawings. On account of the merit of the engines of the steam-
ats, which engines are represented in the drawings.
Lucas, and Co.—Copper and brass articles for engineers. Good work.
and Co.—Apparatus for obtaining aerated fresh water from sea water. Prac-
lity and success.
ish Rubber Company—Driving belts. Practical utility and success.
er Foundry Company—Steam turbines, fans, &c. Originality of design and
success. [ciency, and good arrangement.
ons, and Peel—Pumps, hydraulic press for beet-root sugar. Practical effi-
A.—Untanned leather driving belts, &c. New manufacture, good work.
and Sims—Portable steam-engine, 20-horse power; portable steam-crab,
power. Excellent work, practical success.
, and Sons—Marine engines. Originality of design, and general excellence.
—Fire-engines. Ingenuity of design. [tical utility.
W.—Machine for cleaning casks without unheading. Original design, prac-
and Company—Engines, pumps, boiler feeder, magnetic machine for sepa-
on and brass turnings. Practical utility.
, and Sons—Tubes and fittings. Good work.
and Co.—Spring balances, dynamometers, pressure gauges, &c. Excellent
M., and Co.—Oil mill. Good work. [workmanship, practical success.
Mason—Fire-engines. Good workmanship, and excellent performance.
W.—Regenerative gas engine, regenerative furnace, water meter. Prac-
ion of furnace and water meter, originality of the whole.
Tube Company—Seamless metal tubes, rollers, &c. Good work.
and Co.—Traction-engine. Simplicity and practical utility.
James—As inventor of the water-wheels, fans, pumps, &c., exhibited.
and Warham—Winding engines. Excellent work.
Gregor—Inverted cylinder screw engines. Simplicity, general facility for
general excellence.
and Son—Traction-engine. Good design and good workmanship.
son—Leather driving belts, buckets, hose, &c. Good work.
. H.—10-horse power thermo-expansive engine. Good application for super-
ium. [success.
A.—Differential pulleys, &c. Original application, practical utility and
and Sons—Horizontal steam-engine driving corn-mill. Good work.
C., and Co.—Portable steam sugar-cane mill. Good arrangement, practical
and workmanship. [sign, practical success, good work.
Brothers—Thomson's vortex turbines, fan, pumps, &c. Originality of de-
Commissioners of Victorian Exhibition—Quartz-crushing machine. Effi-
and adaptation, practical utility.

STEPHENSON METAL TUBE AND COPPER ROLLER COMPANY, of ham, exhibit in Class VIII., No. 1994 (eastern annexe), remarkstrikingly interesting examples of the productions of their works, they have been awarded a Prize Medal. The varied specimens this company are of that character which must convince any essing a knowledge of this branch of manufacture that they are of great mechanical skill, and a careful application of chemical to the metallurgical operations carried on at their establishmongst the various articles exhibited, we will first notice the opper cylinders: some of these are 16½ in. diameter, but may ft. diameter, or even larger, by the same process. They are calico printing, embossing rollers and cylinders for paper ma- a great variety of intermediate sizes, down to what would casual observer a thin copper wire, but which, in reality, is a opper tube, scarcely the one-sixteenth of an inch diameter: this as one out of many illustrations of the remarkable ductility phorised copper from which the tubes and cylinders are manu- It has hitherto been considered by chemists that phosphorus per brittle; but here, when combined with the metal accordpatented process of the Messrs. Parkes, the result proves that e copper stronger, also much more ductile and malleable, than ry copper of commerce. This is a most important feature metal is used for the fabrication of printing cylinders, tubes, eet metal, especially when required for bending, twisting, or , as in the case of locomotive feed-pipes, fire-box plates, tubes ific purposes, condensing worms for distillers' use, telegraph eets for reducing into copper foil. This is proved unmistakexamples shown. One specimen, a piece of tube compressed oller a steam-hammer until perfectly flat, evinces no sign of Another illustration we find in the piece of an ingot of phospper, forged red hot, and then partially cut round, which sus- cold 140 blows from an 18-lb. sledge hammer without breakrd, which is part of an ingot of well refined copper, taken from arge as the ingot just referred to, within half a minute of each other, but which was not phosphorised, broke when cold with five blows from the same hammer. It is scarcely possible to give more convincing proofs of the great increase of strength imparted to the copper by the phosphorising process than those we have alluded to. Calico printers will, doubtless, be much interested with the patent compound printing cylinder of seamless copper drawn over an iron body, the bearings of which are lined with copper. It will perform an equal amount of work, may be used in precisely the same manner, and costs scarcely half as much as the ordinary solid copper roller. When cheapness is a desideratum, as in heavy rollers for embossing, calendering, or printing purposes, it may be attained by the use of the patented brass rollers, also exhibited by this company, the characteristic feature of which is that the metal of which they are composed is rendered perfectly homogeneous throughout, and from the density and great strength of the alloy it will bear without injury a much greater pressure in the embossing and printing processes than ordinary brass rollers, therefore lasts longer. In tubes for surface condensing, some beautiful specimens are shown of seamless copper and brass: and one recently patented for this purpose (which is also applicable for distillers). It consists of a seamless tube of copper or brass, electro plated, and as it is scarcely affected by the corrosive action of saline vapours, such as tubes are exposed to, which in some cases rapidly destroys other kinds of tubes, it possesses great advantages, and is, we are informed, highly approved of by engineers. Another most interesting portion of this company's contribution relates to the production of seamless aluminium tubes, which are applicable to a variety of purposes, such as telescopes and for jewellers' use.

The COALBROOKDALE IRON COMPANY make a most extensive and important contribution in Class XXXI., No. 6019. The works of this company are so well known, and their productions so universally esteemed, that the most elaborate piece of casting, when known to come from Coalbrookdale, is viewed without astonishment, although not with indifference. We have become so thoroughly accustomed to the exquisite design and beautiful finish of the castings sent from these works, that nothing, however highly finished, surprises us. The court allotted to the Coalbrookdale Company for the exhibition of the articles sent by them is in immediate contiguity to the Bessemer Steel Trophy, south transept, east dome. The first object that strikes the eye is a very handsome ornamental park entrance, 54 ft. wide by 25 ft. high, consisting of six sheets or doors, suspended on four pillars or columns, of a construction as novel as ornamental, with figures of Victory as finials. Cromwell between Peace and War, composed as a fountain, with Triton figures bearing shields, and jets arranged on scrolls, similar to the arrangement on the tombs of the Medici. There is also exhibited here a beautifully executed temperantia drinking fountain, consisting of a bronze statue of Temperance holding a dove, which drinks from a water lilly, mounted upon a massive granite base: the canopy is of cast-iron work, ornamented with various descriptions of water plants. There are several other drinking fountains, as well as garden fountains, of many and elegant designs. Two large electro-bronzed vases are also shown; one is called the "Milton Vase," the subjects around which are "The Fall," and "The Expulsion from Paradise." The other is a garden vase, with panels of flowers, and medallions of "Night and Day." Many other vases of smaller size are also exhibited, as also candelabras of many descriptions, garden chairs, hat and umbrella stands, steel, ormolu, and electro-bronzed fenders, also grates of several designs; a large display of fancy castings in electro-bronze; flower-pot stands, with terra cotta pots; close fire-ranges, of novel construction, and two magnificent spiral staircases of cast-iron bronzed.

IRON MINIUM—SUBSTITUTE FOR RED LEAD.—Upon a previous occasion we referred to the advantages resulting from the use of iron minium as a substitute for red lead, and in the Belgian department, near the eastern passage of the north-western transept, will be found some specimens of the material. Perhaps the greatest recommendation of the iron paint is, that the raw material from which it is manufactured is itself so cheap that it is not worth while to adulterate it, the consequence being that a good metallic paint, at a lower price, may be relied upon. The advantages which the inventor claims for the iron minium are—its solidity, its durability, its cheapness, and, above all, its property of preserving iron completely from oxidation, and of hardening wood. The iron minium, which we should describe as a red hematite iron ore, well washed, and reduced to an impalpable powder, is employed precisely in the same way as all other paints, with boiled or unboiled linseed oil; dryers, such as litharge, but not turpentine, being added if the oil be not boiled. When used for coating iron, some dryers other than litharge should be used, and the paint must be permitted to dry completely before it is exposed to the action of the water. It appears that the difference in the first cost to the consumer of the iron minium, as compared with red lead, is but about one farthing a pound, but it is estimated that, inasmuch as the iron minium will cover a larger surface (why, we are at a loss to conceive), it may be employed at one-half the cost of red lead, and at one-third that of white lead. We suspect that the experiments have been made upon the same principle as those for ascertaining the relative merits of South Wales and North Country coal; that the lead has been tested in a manner only suited to the ground hematite, and the conclusions drawn from the results obtained. The principal manufacturer of this iron minium is Mr. A. DE CARTIER, of Auderghem, near Brussels. It is a remarkable fact that, although the iron minium has been in use for 12 years, comparatively few of the firms and individuals who have given testimonials state anything that would lead to the inference that the iron paint is more than a cheap substitute for lead, which can be employed where it is necessary to cover a large surface with a smaller first outlay than would be necessary for lead paint. By the judicious omission of the close of a quotation in the second page of his commendatory pamphlet, Mr. de Cartier permits it to be inferred that Mr. Jouvin, who reports upon the result of using lead paint on the *Guienne*, has come to a series of unphilosophic conclusions, and has propounded theories which, to say the least, require confirmation before being taken as correct. As to the durability and cheapness of the iron minium, and its applicability to coating ships' bottoms, a few facts may be stated which we think will be conclusive: Mr. Jouvin describes a lead paint to require renewing at the end of 12 months, and Messrs. Bruhns and Sons, of Lubeck, under date Nov. 24, 1860, write that at the beginning of the previous year Mr. de Cartier's agent supplied them with 100 kilos. for coating the iron steamer *Alexander*, and that they then required a similar quantity, as they were going to paint it over again. The difference in first cost is found to be 5 centimes, or ½d. the kilogramme, the iron minium costing 75 centimes the kilogramme, and the red lead 80 centimes. And with regard to the value of the iron minium for coating ships' bottoms, Messrs. Ormston, Dobson, and Co., of Newcastle-on-Tyne, certify, "that the iron minium they have had at various times from him has answered every good purpose, particularly above water." Were the red hematite of this country treated, its low price might secure its adoption.

FRICTIONAL GEARING.—In the western passage of the western annexe will be found a steam-winch, exhibited by the PATENT FRICTIONAL GEARING COMPANY, of Glasgow, which will well repay inspection. As most of our readers are probably aware, the frictional gearing is intended as a substitute for toothed wheels of every description, a few, we think, who examine the working of the wheels can doubt that the improvement is very great. The mode by which the motion is communicated is extremely simple; the peripheries of the wheels are provided with continuous and endless Λ shaped grooves, the extreme points of the Λ being removed to ensure a good bite, and each Λ fitting into the recess formed between two W on the other wheel; the smallest possible pressure is thus made to give a very large amount of force. It is calculated that the adhesion or driving hold of the surfaces of these grooved wheels is about nine times that of plain surface frictional wheels. When working at 1000 circumferential feet per minute, the contact pressure requisite for transmitting a standard horse power is 22 lbs.; at double that circumferential speed, 11 lbs.; and in the some relative proportions at other speeds; a wheel 8 feet in diameter, working at 40 revolutions per minute, gearing with a pinion, requiring about 1 ton of contact pressure to transmit 100 indicated horse power. This system of gearing seems to be thoroughly adapted both to heavy and light machinery; and wherever there is liability to sudden concussion or strain they are invaluable, since from their very principle it is evident that they cannot be damaged; for in case of a sudden jerk a slight and immaterial slip is the sole inconvenience, the wheels being left in quite as good order after the jerk as they were before, instead of, as would be the case with ordinary teeth gearing in use, broken teeth having to be repaired before the working could be continued. The smoothness with which the frictional gearing works is remarkable. Some of the wheels upon this system have been in use for more than four years, and continue to give the greatest possible satisfaction; and it is considered that where the wheels are properly proportioned to the work to be done they are more durable, and transmit power with less waste by friction than is incurred by using toothed gear. As an evidence of the advantages derived being of a really practical character, it will suffice to state that this system of gearing has been adopted by many of the principal ironmasters, manufacturers, and others in Scotland and South Wales; and with such satisfactory results that many of them have given permission for the gearing to be examined at their works in operation. Even for such heavy work as the rolling of iron the grooved wheels have been found applicable; and in their application to heavy and light rolling purposes they may be seen in use at the works of Messrs. Sharp and Brown, Birmingham; of the Dundyvan Iron Company, Coatbridge; of Messrs. William Baird and Co., Muirkirk; of Messrs. Strang and Hamilton, Glasgow; of the late Mr. Anthony Hill, Merthyr Tydvil; and at several other places. The wheels have also been employed as screwing rolls for straightening bars and tubes, for winding-engines, for steam-cranes, as well as for driving fans, circular saws, rotary pumps, &c., and as the company grant licenses to the users of machinery for the unlimited use of the wedge and grooved frictional system in their works, we know nothing likely to prevent their general introduction.

SAFETY APPARATUS FOR STEAM-BOILERS.—M. LETHULLIER-PINEL, of Rouen, exhibits in the French machinery department, western passage of western annexe, a very ingenious safety apparatus for steam-boilers. The chief feature of the invention consists in the application of magnetism to move the index pointer. The usual method of making apparatus for indicating the height of water in steam-boilers does not allow an escape of steam from the joints to be avoided; the unsatisfactory manner in which they act is often the cause of the most terrible accidents; it is, therefore, necessary, as well as advantageous and humane, for every one possessing a steam-boiler to possess also an apparatus that will constantly, and with certainty, mark the height of the water in the boiler, and give warning when, through neglect or forgetfulness, it varies from its proper height. The magnetic indicator establishes a communication between the interior and the exterior of the boiler, through the brass collar, leaving the rod free, and doing away with all conic and packed joints, as well as the inconvenience and necessity of constant watching to see that the float acts. A float, proved to stand the pressure of 15 atmospheres, is joined to an iron rod, to the other extremity of which is attached a strong magnet, that falls or rises in a brass box with the rise or fall of the water in the boiler. On the exterior of one of the sides of the box is placed an iron needle, without any support, and held on the brass merely by the attraction of the magnet, which it follows in all its movements, running as it rises and falls on the face of the box, which is graduated to correspond with the proper height of water. The superior or inferior limit of the float's course cannot be attained without touching the movement that opens the whistle, which immediately makes known the want or excess of water. For new boilers this indicator can be made to unite in one piece several distinct apparatus, to avoid piercing the boiler in several places; and the price is about the same as the cost of other apparatus. The magnetic indicator has been adopted in the Imperial Navy, and is likewise very extensively used by private manufacturers in England, as well as in France, and generally abroad; it is the most efficient apparatus we have seen, and from the fact that stuffing-boxes, and all other parts likely to get out of order, are rendered unnecessary, it is well worthy the attention of all users of steam-power.

IMPROVED IRON BEDSTEADS.—The greater cleanliness and durability of iron bedsteads, as compared with wooden ones, has long since caused the extensive application of metal to this purpose, but, of course, it could not be hoped that the best possible form would be introduced in the first instance. Indeed, it is well known that since iron bedsteads were first used many improvements have been made in their construction, and there are few, we think, who would be bold enough to assert that there is no further room for improvement. In the hardware department, south-eastern court, will be found several specimens of the tubular metallic bedsteads and portable military bedsteads, invented and patented by Mr. THOS. ALLEN, of Hotwell-road Ironworks, Bristol, which have now stood the test of nearly seven years' hard wear, and have been honoured with an Award by the International Jurors, "for excellence of manufacture, and for improvements in metallic bedsteads." The bedsteads are composed entirely of iron tubes, and have malleable iron joints and canvas bottoms; the advantage of getting rid of the dove-tail joints and lath bottoms being that there is no harbour for insects; the bedstead can be used without a mattress, and can be taken to pieces or put together almost instantaneously. They have been extensively used by military officers in the West Indies, Mediterranean, and Aldershot, and are pronounced far to surpass anything else of the kind in present use, owing to the great facility with which they are put together,

and the small space occupied when taken to pieces. Their appearance is extremely neat, and the price very moderate; they have long been used in the Bristol General Hospital, and, no doubt, will be extensively adopted when their existence becomes better known.

BRICK-MAKING AND PEAT-MOULDING MACHINERY.—The brick-making machinery manufactured by Messrs. HENRY CLAYTON and Co., of the Atlas Works, Dorset-square, London, is well known to our readers, few makers having been more successful in the production of really practical machinery. In the western passage of the western annexe will be found some brick and tile-making machinery, which turns out work of the best possible quality, and with a rapidity quite as great as can be desired; and a little further north is a miniature Clayton's machine of similar character, employed by Mr. W. H. BUCKLAND for condensing and moulding the peat in course of treatment by his process. To continuously fill or force clay into a brick-mould (either in a dry or a plastic state) appears to be a very simple matter; but to do so by mechanical means, rapidly and continuously, so as to effectively fill the mould, has proved an extraordinary difficulty, and one (even at this period of advancement in brick-making machinery) not likely to be completely accomplished, although enormous compressive pressure may and (regardless of disproportionate cost) has been brought to bear upon the clay in the mould, yet still leaving the bottom corners imperfect. This, however, is not the only perplexing difficulty and particular objection to be dealt with in the compressing or moulding principles of brick-making machinery, as the easy and perfect delivery of the moulded brick from the mould presents another barrier to rapid production or economy of manufacture; so to deliver, without injury to the shape of the brick, entailing constant cleansing and lubrication of the mould. Messrs. Clayton, therefore, gave great attention to the expressing system, and succeeded in removing one by one the difficulties as they presented themselves. The last great difficulty to be overcome therein was in the important act of moulding through dies so as to form a perfect rectangular stream of solid clay. At this point all previous mechanical efforts to express perfect bricks (the mechanism in all other respects answering well) came to a stop. The excessive friction of the clay at the angles of the stationary plate die, and the greatest resistance to its passage at such angles, not only delayed production, but tore the edges, or fractured, and often completely rent, the very bodies of the bricks themselves. This led to the introduction of cores into the orifices of such dies, which somewhat abated this evil, but only permitted the production of perforated or tubular bricks, whilst the production of solid bricks through dies, by which alone efficiency could be given to expressing machines, still remained an impracticable problem, till solved by the invention of H. Clayton's simple and beautifully-working rotary orifice or roller dies, which at once removed all angular friction and resistance, and enabled the machine to express a stream of sufficiently compressed and perfectly formed solid bricks superior to hand mould manufacture in many important respects. The results of machine facture in production processes and operative cost vary materially according to the nature of soils, ruling rates of labour in district, and the quality of brick or tile sought to be produced; but, comparing equally, the average will generally prevail. Having regard to such average, the result of detailed practical comparative statistics, from digging the clay to completely burning the bricks, of the various processes of and incident to the hand-mould system; the dry or semi-dry compressing processes, and those of and incident to Clayton's system, show a difference of from 7s. to 9s. in favour of Clayton's machinery. In these machines perfection certainly seems to have been very nearly reached, and we doubt not that the increased publicity which will be obtained for the invention by its place in the International Exhibition will ensure its even more general adoption. In proof of their great superiority, we may mention that a Prize Medal has been awarded to Messrs. H. Clayton and Co.'s machinery, with the unmistakable appendix thereto in the Jurors' reports—That they consider Clayton's to be "the best brick-making machine in the Exhibition."

APPLICATION OF ELECTRICITY TO STREET ILLUMINATION.—In the portion of the French department devoted to "Instruments of Précision," a very ingenious automatic electric light regulator is exhibited by Mr. V. SERRIN, of Paris, and on Tuesday evening the visitors to the Polytechnic Institution had the opportunity of witnessing a series of brilliant experiments, which few not immediately connected with the scientific world could have hoped to have seen elsewhere. The inventor had provided no less than seven of his lamps in various parts of the building, the whole of them being connected with a single Grove's battery of 50 cells, and lighted and extinguished from the same point. The experiments were rendered particularly interesting by the very able lecture on the progress of invention in this direction with which Prof. Pepper, F.C.S., the indefatigable manager of the institution, accompanied them. The Professor remarked that, although the electric light was obtained by passing electricity between two charcoal points, many niceties must be attended to before the light can become automatic. For instance, if the charcoal points be either in contact or too far apart there could be no light; it was only when they were separate at a certain distance that light was obtained. Out of at least forty systems Mr. Serrin's was, he remarked, the only one that fulfilled all the essential conditions. Mr. Serrin's first experiment was a display of what is termed the naked light, which was, of course, very dazzling to the eyes. The second was the exhibition of light under a large prismatic shade, constructed by Defries, of Houndsditch. The light was then seen under a ground-glass shade. The lecture-hall was next lighted up by divergent rays, reflected from a parabolic mirror. Nearly parallel rays were then thrown from another mirror, and it was stated that they would conduct light to a distance of three miles, where small print might be read; after which the use of the light for signalling was pointed out. The electric light was then favourably and practically compared with the combustion of ordinary candles. It burnt, in view of the audience, in an atmosphere of carbonic acid; it was brilliant under water, and thus appeared capable of application to submarine operations and in coal mines; and, finally, the audience was invited to proceed outside the building to behold a brilliant imitation of a comet, produced by the projection of rays from an electric-lamp, reflected from a parabolic mirror. Mr. Serrin's invention has been practically and successfully employed in conducting railway works in Spain—the coolness of the night thus being made the working time, instead of the heat of the day—as well as in Brazil, China, Egypt, and elsewhere. Mr. Serrin's rewards have, as might be expected, been very numerous; he has received silver medals at the Exhibitions of Besançon, Nantes, and Metz, favourable reports from the Society for the Encouragement of National Industry, and from the French Academy of Sciences (Institut de France), as well as the platinium medal from the French Society for the Encouragement of National Industry, and the Prize Medal of the International Jurors. Mr. Serrin finds, after careful observation, that the relative speed of the carbon points must be as 11 to 5, and that this is about correct is apparent from the fact that with his automatic lamps he is enabled to maintain the light for any length of time—the length of the carbon pencils being the only limit—without the slightest flickering. We certainly recommend all who have the opportunity to witness the splendid series of experiments which Mr. Serrin has prepared.

The *Times* has devoted considerable space to an examination of Class I. in the International Exhibition. The series of papers, we believe, will be printed in a pamphlet form; we may then offer some comments on several of the statements adduced, and in the meantime shall be glad of any communications from Correspondents who may differ from, or wish to comment on, the views propounded. In concluding, the writer remarks:—

"We have now completed our review of the smelting and manufacture of iron throughout the world, so far as they are represented in the present International Exhibition. We have earnestly striven to mete out justice with an impartial hand, neither fearing to censure nor being reluctant to praise. Great Britain has come out nobly, notwithstanding the absence of many of our leading ironmasters. We will not enquire further into the reasons of this indifference. Those who have exhibited are entitled to the gratitude of those who have not. Sweden amply sustains her long-established reputation. Prussia and Nassau have much distinguished themselves. Austria deserves great praise, especially for the liberality and freedom with which she has communicated information. Belgium might have done better. Russia has done well. Italy gives proof of vigorous rejuvenescence. France, remarkable to say, has not even attempted to do justice to herself. Spain presents a melancholy spectacle, thanks to somebody or other. Canada has covered herself with honour. The United States are nowhere. Australia has revealed all her treasures, and excited the envy of the world."

IMPROVEMENTS IN GUNPOWDER.—Some improvements in the mechanism required for, and in the manufacture and composition of, gunpowder have been invented by Mr. Wm. Bennetts, of Tuckingmill, Camborne. The ingredients consist of lime, nitre, sulphur, and charcoal. The lime is dissolved in a sufficient quantity of water to bring the other ingredients into a paste. The lime, after having been made into a solution, is strained through a fine sieve; this solution is added to the other ingredients. The whole is then put into a mill, and ground until it becomes a paste. It is then taken out of the mill and passed between two rollers; one roller is grooved, the other is plain. The powder by passing between the rollers is formed into long strips of a triangular shape. It is then carried on an endless web or canvas over some hot tubes, which are heated by steam, hot water, or any other artificial heat which may be applied. By this means the powder is easily broken into grains. This mode of manufacture prevents a great deal of danger, as the powder is pulverised and brought into grains while in a wet state. The lime makes a firm grain, and resists the damp, and gives a certain degree of lightness, which increases the bulk 25 per cent. over ordinary gunpowder, which is a great advantage for blasting purposes. Plaster of Paris, blue lias, Roman or Portland cement, or other strong cementing substance may be used as a substitute for lime. And he finds that for blasting purposes the following proportions answer very well—nitre, 65 parts; charcoal, 18; sulphur, 10; and lime, 7; but the proportions vary according to the strength required.

PROGRESS OF INVENTION—ANNUAL RETROSPECT.

TREATMENT OF PLATINUM IN LARGE MASSES.

The value of a handy record of what has been done in any branch of industry is well known to be of vast importance, both in leading the ingenious to turn their attention to the discovery of improvements connected with their avocations, and in preventing disappointment from the attempt to develope supposed improvements, and with a view to furnish engineers and architects with equally useful information, Mr. G. R. Burnell, C.E., has undertaken the production of an "Annual Retrospect of Engineering and Architecture,"* his first volume, extending from January to December of last year, having just been issued. The work is conveniently arranged in five divisions, in which civil engineering, architecture, military engineering, naval engineering, and miscellaneous are respectively treated of. After carefully perusing the work, we are bound to conclude that its value would be much enhanced were the simple record of facts kept more continually in view, or were the book really made "to give a comprehensive statement of the views of scientific and practical men," rather than the opinions, often extremely conservative and uncalled for, of the editor. Each of the divisions to which we have above referred is subdivided into sections, each section containing what may be described as a series of ordinary magazine articles. It is unnecessary to particularise the numerous points in which which Mr. Burnell has descended to personalities, and we shall also pass over his grammatical criticisms, as we do not regard the style of the work to be so high as to indicate the editor's ability to act as the monitor of his professional brethren; but we must remark that it seems scarcely consistent to assert, as Mr. Burnell does, that the new Blackfriars Bridge "will really form the most important link in one of the greatest London thoroughfares, and the materials employed in its construction must, for that very reason, be of a nature to last almost literally 'not for an age, but for all time;'" and then to condemn Mr. Page for proposing a bridge of "the great width of 75 ft. between the parapets;" and to complain of the Committee of the Bridge House estates for selecting a bridge of cast and wrought iron combined, in preference to a stone bridge, on the ground that iron has not been sufficiently tried to warrant its adoption.

But we might continue in this strain until our readers would care but little whether railways, roads, or bridges in London existed or not, so that they escaped the plague of having Mr. Burnell's name continually in their ears or eyes; we shall, therefore, pass over the sections devoted to railways and roads, harbours, docks, and canals, gas water supply, and sewerage, agricultural and mechanical engineering, in order at once to reach that relating to mining and metallurgy, which comprises two articles, the one on the new process of smelting platinum discovered by Mr. St. Claire Deville, and the other on the discussion between Messrs. Fremy and Caron upon the agencies which produce the cementation of steel. The latter subject has been so fully discussed in the Journal that it is unnecessary to re-open it; but as Mr. Deville's process is attracting much attention, in consequence of the enormous masses of the metal which Messrs. Johnson, Matthey, and Co. have obtained by it, one of which is exhibited in the International Exhibition, we shall extract some portions of Mr. Burnell's article, which, as he gives the scientific details only, and in a very clear style, is worth the whole cost of the book. Mr. Burnell tells us that—

M. St. Claire Deville (who had previously rendered great services to the arts of applied chemistry by his discoveries with respect to the methods of obtaining aluminium, crystallised borax, and silicium, in conjunction with Mr. Wohler, of Gottingen), undertook a series of experiments on the treatment of platinum ores, with the assistance of M. Henri Debray, one of his own pupils. These gentlemen, in the preliminary investigations they undertook, recognised that platinum in its natural state was habitually associated with a series of other metals, which might be divided into two classes, perfectly distinct from one another, but presenting at the same time marked analogies. Three of these metals are of light specific gravities—viz., ruthenium, spec. grav. 11·3; rhodium, 12·1; and palladium, 11·8. The common equivalent of these metals is 53. The other three metals are, on the contrary, of great specific gravity; for the specific gravity of osmium is 21·4, or the greatest yet known, and those of iridium and platinum are 21·1. The common equivalent of these three last minerals is 98·5. All the six require a very high temperature before fusing; the palladium fuses with the greatest readiness, the osmium with the least, and the platinum with a temperature intermediate between that of palladium and osmium. Two processes were proposed for the purpose of extracting the palladium from its ores, either in a pure state or alloyed with iridium, which metal is found to communicate some valuable properties to the alloy.

The first of the processes for the reduction of platinum suggested by MM. Deville and Debray, known by the name of "cupellation," very closely resembles the one used in the arts for separating silver from the lead which is always contained in the same minerals; the second process is more simple even than the first, and it consists in an ordinary smelting.

In the new process for treating the ores of platinum by cupellation, the ore of that metal is mixed with a portion of the ore of galena (the sulphate of lead), and the mixture is exposed to the heat of a reverberating furnace. The lead under these circumstances quits its original compounds; it strongly attacks the platinum, entering into combination with it, and communicating its own fusibility. The alloy thus formed is exposed to the action of the heat of the furnace for a considerable time, and under its influence a considerable part of the lead is burnt away, passing into the state of litharge, and escaping in the form of vapour. As the cupellation advances, the lead oxidises, and the fusibility of the alloy diminishes until it becomes almost viscid; the blast is then turned off, the heat is increased, and directly the metal has resumed its fluidity it is run into lingots. In this state it still retains one-fifth of lead, and in order to remove this metal the lingots are, as it were, roasted in a furnace so contrived as to produce a highly oxidating flame, which still more completely removes the lead in the form of litharge, leaving the platinum in the form of a spungy flower. It is then exposed to the heat of jets of oxygen, and carburetted hydrogen, or better still of hydrogen gas, burnt in contact with lime, so managed that in the commencement of the operation the oxygen should be in excess, for the purpose of removing the lead still present, and at a later period the copper and osmium are eliminated, passing off as green vapours. When the flame becomes colourless, the platinum will be found to be refined, and in a fit state to be cast into the required form.

The alloys of platinum and iridium are far more unattackable by acids than the pure platinum is, and they are, therefore, of greater value in the arts. In order to obtain them, the platinum ore is broken into grains after the bulk of the lead has been removed as before, and is roughly mixed with lumps of lime, placed in a small furnace, and exposed to the heat of a blowpipe directing upon the mass to be fused the joint stream of oxygen and hydrogen gas. The heat is made to act upon the mass until the odour of the osmium is no longer perceptible; the metal is then withdrawn and thrown suddenly into cold water, which reduces it immediately into a granular state, and subsequently it is fused by the same process as the one before described. The kilns, if such a term can be considered applicable to the small recipients in which the metal is exposed to the flame of the blowpipe, are made of quick lime; and the temperature to which they are exposed is so intense that a commencement of fusion takes place in the lime itself. In order to reduce the pure iridium, the temperature must be even more intense than when platinum is to be obtained, and in that case the carburetted hydrogen cannot be used, but is forcibly replaced by pure hydrogen gas.

The platinum, which is intended to be subsequently worked, may be cast in iron moulds faced with graphite or black lead, or in moulds of quick lime. It can even be run into ordinary sand moulds, and made to receive any amount of decoration that may be desired; and M. Deville cast a platinum toothed wheel, which he presented to the Mint of St. Petersburg, as a specimen of the results of his process. The merit of the latter consists in the production and application of intense heat by the joint combustion of oxygen and of hydrogen gas in contact with lime, and the ore partially purified. Its commercial success under these circumstances depends on the cheap and ready production of oxygen gas; MM. Deville and Debray, therefore, turned their attention to securing the latter result, and they have succeeded in so doing by decomposing by heat one of the cheapest and commonest substances in applied chemistry—viz., sulphuric acid. It is known that at a low red heat that acid passes into a state of oxygen and sulphurous acid, by the aid of a very simple apparatus, and it is in this manner MM. Deville and Debray calculate that they can obtain the oxygen they require at the rate of 1d. or 2d. per yard cube, or for about the price of common coal gas. They allow the acid to fall drop by drop into a retort, whose interior contains thin plates of platinum; the acid decomposes under the heat to which the retort is exposed, and a mixture of sulphuric acid and of oxygen is distilled; this mixture is passed through a worm, kept cold, in order to condense the water, and the sulphurous acid given over, and the gas passed through a vessel traversed by a current of water. It is calculated that 22 lbs. of ordinary sulphuric acid will give off more than 9 cubic yards of oxygen, and that it would only require about 15 or 16 lbs. of coke per cubic yard evolved to heat the retort to the required heat. M. Deville suggests that the expense might further be diminished by employing the sulphurous acid which remains for the production of the hyposulphides, or by converting it again into sulphuric acid by the addition of a small quantity of nitric acid. It is impossible to foresee what may be the ultimate consequences of this discovery for the economical production of oxygen gas, either in the reduction of the more refractory metals, or in the means of producing artificial light; and it constitutes, indeed, the most important part of the recent labours of MM. Deville and Debray. It appears that there are manufacturing chemists in Paris who are willing to sell the oxygen gas in sacks, and the English manufacturers cannot fail to follow their example. Many technical processes have lately proved commercially unsuccessful, on account precisely of the cost of this important constituent of the atmosphere; so that the incidental discovery made by MM. Deville and Debray in the course of their researches upon the metallurgy of platinum may prove to be of far greater practical importance than even their discoveries upon the latter subject.

The remaining section of the civil engineering division is appropriated to telegraphic engineering. The architectural division comprises a section on styles and design, and another on practical architecture; and the military and naval engineering divisions are also copious; whilst to render the work complete, Mr. Burnell has appended a sketch of the more important legal decisions connected with engineering. The book is well printed, and forms a handsome volume, at a low price.

* "The Annual Retrospect of Engineering and Architecture; a Record of Progress in the Sciences of Civil, Military, and Naval Construction." Edited by G. R. BURNELL. London: Lockwood and Co.

THE ASSOCIATION FOR THE PREVENTION OF STEAM-BOILER EXPLOSIONS, AND FOR EFFECTING ECONOMY IN THE RAISING AND USE OF STEAM.—At the last ordinary monthly meeting of the executive committee, held at the offices, Corporation-street, Manchester, on July 30, Mr. William Fairbairn, C.E., F.R.S., in the chair, Mr. L. E. Fletcher, chief engineer, presented his monthly report, of which the following is an abstract:—

Three explosions occurring during the past month, to boilers not under the inspection of this Association, have come to my knowledge. One of these took place in Manchester, the other in the neighbourhood of Newcastle, and the third in London, while all three were attended with fatal consequences. The plates of the first are reported as having been found on subsequent investigation so reduced by corrosion as not to have exceeded the thickness of a sheet of paper; while it is worthy of remark, with regard to the second, that its explosion had seriously damaged another boiler alongside of it, which, however, fortunately happened at the time to be out of work, or, from the impulse received, it must have exploded in turn. This is frequently found to be the case, and the fact is of interest, as affording an indication of the variety of forces developed in explosion which, as has been previously pointed out, evidently cannot be summed up merely in that of disruption, and the reaction consequent on unbalanced pressure.

In addition to the above, however, it becomes my duty to report the occurrence of explosion to one of the boilers belonging to a member of this Association, and which it is to be regretted, was attended with loss of life to the fireman. This is the first fatal explosion which has happened to any of the boilers under the inspection of the Association since its establishment, nearly eight years ago, to which should be added three cases of collapse of furnace flues, not attended with any serious consequences, which arose in two instances, if not in all three, from shortness of water. During this period, 656 dangerous defects have been pointed out in the boilers under inspection, in which serious injury might have arisen in each case; while, upon limited enquiry, it has been found that no less than 202 fatal explosions have occurred in that time to boilers not under the inspection of this Association, which have been attended with a loss of 438 lives, in addition to serious injury to 467 persons, and considerable damage to property. The explosion last referred to, occurred to one of a pair of ordinary cylindrical double-flued boilers, working side by side, and connected together. Both were set upon mid-feathers, and were of precisely similar construction and dimensions, the length of each being 34 feet, the diameter of the shells 7 feet, of the flues 7½ inches, and the thickness of the plates ⅜ths of an inch throughout, with the exception of the flat ends, which were 9-16ths of an inch. The fittings consisted in each case of a glass water-gauge; a back pressure and feed stop-valve combined; a clack or out valve, of mushroom construction, opening against the pressure in the boiler; a dead lever safety-valve, loaded with a single weight to the pressure of 35 lbs. per square inch; in addition to a steam-pressure gauge common to both boilers as long as both the valves were open, but not otherwise. The explosion was occasioned by a rent in the shell, which took place directly through the line of rivets, at one of the longitudinal seams in the second ring of plates from the front of the boiler, the seam being on the right hand side, 3 ft. from the centre or "keel" line at the bottom. The condition of this seam was such that the edge of the outer plate was uppermost. The cause of current was thinning of the plates at this seam by external corrosion, through which they become reduced to about 1-16th of an inch in thickness. The corrosion extended throughout the length of the seam, which was about 2 ft. 6 in., and affected the plates on both sides of the lap to a width of from 4 to 6 in. The rent did not extend longitudinally beyond the limit of this ring of plates, but ran along the transverse seams of rivets on each side of it, almost severing a complete belt from the boiler. The reaction from the opening raised the boiler momentarily almost on end, as was attested by the distortion of the fracture of the connections, the indentations in the bottom plates, and the fact that a pipe, previously overhead, had become buried beneath it, while the twin boiler alongside was blown bodily in a lateral direction. Had the longitudinal seams of the boiler instead of breaking joint, been in line, which is too frequently the case, the rent would certainly have run from one end of the boiler to the other, and the destruction of property, and very probably that of life also, have been more serious. This defect was one that could scarcely have escaped detection on a careful examination of the corresponding the plates in the external flues. Still, it should be borne in mind that the internal boilers set on mid-feathers are neither as accessible or visible as they are in the case on two side walls with a split flue. The side flues in the latter case admit of the face to face with the plates and seams in a manner which cannot be done in the former, in which many of them can only be seen obliquely at a very great disadvantage, and those at the upper part of the flue, in what may be termed the tip of the wing, frequently out of reach altogether.

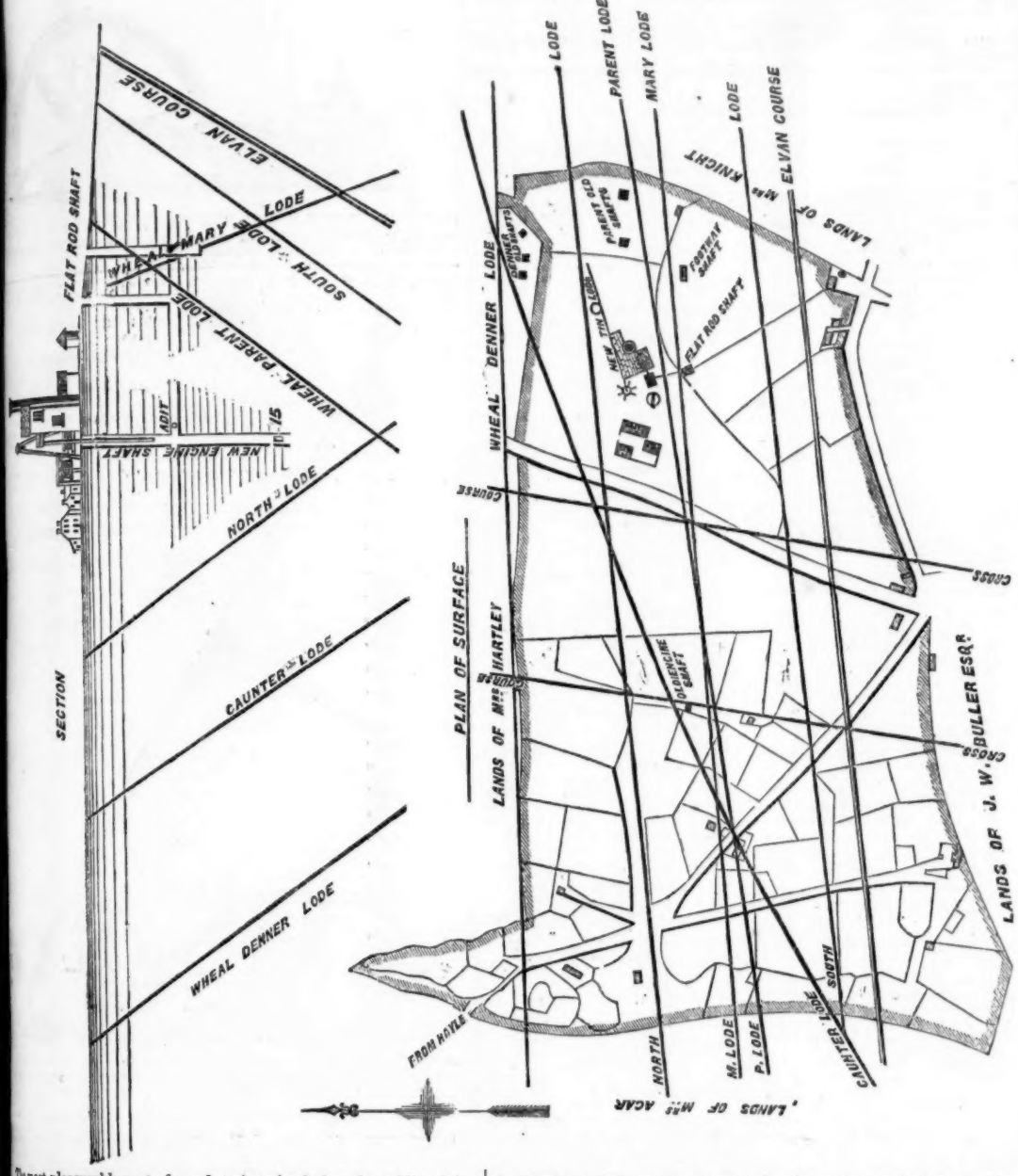
All the members must be aware that, for the express purpose of detecting such defects as the above, the Association affords, in addition to the external inspections, the opportunity of having every boiler "internally and thoroughly" examined at least once a year. The importance of these "thorough" examinations has been repeatedly called attention to, and every opportunity taken to promote their being made, and, in order to suit the convenience of members as to time, the ordinary routine of visits is entirely set aside at holiday times, such as Whit-week, Christmas, Easter, and race weeks, when the Inspectors may exclusively devote themselves to this special service.

It is much to be regretted that the Association was not afforded an opportunity of making a "thorough" examination of this boiler, either in the year 1860 or 1861, when in consequence of attention being specially called to this omission, our Inspector, at the request of the owners—visited the works last Easter, the boiler was found unprepared, the flues being imperfectly swept, and the plates coated with soot, and the visit had been expressly appointed, in order to effect a "thorough" examination. Under these circumstances no satisfactory examination could be made, which was distinctly stated to the engineer at the time, and subsequently officially reported in writing to the owners. So clearly was this understood, that the next time the boiler was visited the manager of the works went up the flues himself in order to complete the examination, which the want of preparation had previously prevented our Inspector from doing. It is hoped that our members will see from this the absolute necessity of having their boilers prepared for examination. They certainly cannot fail to remember how often this has been pressed upon their attention. A note, referring to it, appears at the head of every notice forwarded to them, of the Inspector's proposed visit, and another in the report on his examination, while reference was made to the subject in the chief engineer's monthly report for June, sent to each member, and, in addition, attention frequently called by special letter, as it was in the present instance. Had it not been of its practical importance, so much had not been said upon so uninteresting a subject, an apology has sometimes been felt necessary for its frequent introduction. Still, though not dry, it is often a question of explosion or no explosion.

Yet another word before dismissing this subject. To expect an Inspector, while the flues are being swept, as is too frequently the case, is really unreasonable; compliance could only result in the accommodation of one member at the expense of another, while it would induce such disorder and breach of appointments as would lead to a general dead lock, especially in such a thronged time as every holiday, when the Inspectors have one continuous string of engagements for these "thorough" examinations, from its beginning to its close, many of them being fixed for months in the month previously. It may be added that the engineer who lost his life had been in the habit of going up the flues every month after they had been swept, and yet did not see the corroded seam. This either shows that the corroded plate was concealed from view in some way in which it was impossible to account for after the explosion, or that sweeps cannot be trusted as witness to the necessity of competent inspection. That sweeps cannot be trusted in engineering work is also clear.

PEAT—TREATMENT AND APPLICATION.—Mr. E. Evans, of Gloucester-terrace, Portman-square, has patented some improvements in treating peat to render it useful as fuel, and for illuminating and metallurgical purposes. The object of one part of this invention is to readily deprive raw peat, so much of its moisture as may leave it fit for conversion while wet, and in its natural state, into such a consistence that within a few hours of being raised from the bog, it can be manufactured into fuel or material for other useful purposes. To attain this object, the patentee combines with the saturated peat mineral or vegetable carbon, such as coal, which, by abstracting its water, so alters its character, that the body or mass thus formed can be readily compressed and moulded into shapes of any required size, and that the materials so added do not injure the qualities of the peat, but rather improve them. In using mineral carbon dust, the patentee prefers that of anthracite coal, the bituminous coals not being so applicable for the purpose; but granulated peat, sawdust, or tanners' bark, or such like substances of a combustible nature, which, after the combustion, leave little or no residuum behind, may be employed. In furtherance of the same object—that of drawing away from the peat a large amount of its superabundant water, and altering its character, so that it shall no longer resist compression, particularly for metallurgical purposes—unslaked lime or some other earthy minerals, or fluxing agents, may be added. In order to render fresh cut peat, as it is raised from the bog, immediately available for the manufacture of fuel, the patentee takes 100 parts of fresh-cut peat, and adds to it, according to the more or less saturated state in which may be found, from 10 to 25 parts of vegetable or mineral carbon, or some other dried combustible materials, as hereinbefore stated, and he sometimes further adds from 4 to 5 parts of unslaked lime or some other earthy minerals, till the mass is the whole well together in a pug-mill or other suitable machine, till the mass is into a state of consistence suited to receive pressure, and to be moulded into bricks, or forms of any other kind. A fuel of great heating power is thus obtained, useful for raising steam in ships, locomotive and stationary engines, and for a variety of other purposes. When the fuel is intended for the smelting furnace, it may be incorporated with the dressed ores of the metals and the flux for the more ready reducing and applying at one and the same time the fuel and the flux for the more ready reduction of the ores. For the production of illuminating gas the patentee takes the crude oils obtained from coal, coal-tar, the oil extracted from bituminous shale, petroleum oils, or one or more of the cheaper hydro-carbonaceous materials of commerce, and incorporates them, singly or combinedly, with peat, adding, if necessary, a small quantity of lime, to facilitate the extraction of the water, and render more perfect the amalgamation of the peat with the oils; and in this manner a substance is produced from which for illuminating purposes can be obtained in great abundance, and which compares favourably with coal in the manufacture of lighting gas. The patentee claims, also, the peat to be substituted for coal in the manufacture described, to render it useful as a fuel for smelting raw or wet peat in the manner described, to render it useful as a fuel for smelting ores. Also, the combination of peat with the crude oils distilled from coal, coal-tar, the oils distilled from bituminous shale, petroleum oils, and the cheaper hydro-carbons, either together or separately, for the purposes, and as a combined fuel and flux for smelting ores. Also, the combination of peat of

THE GREAT NORTH TOLGUS MINE.



The most pleasurable part of our duty is to lay before the public mining statements of a *bona fide* character. The prospectus of the Great North Tolgus Mine is one of those that it is a satisfaction to commend to the capitalists of this country. The investors in mining in the present day are quite a different race from those who some years ago recklessly grovelled in the dark, and expended their money upon any scheme that the ingenious concocter might set before them, no matter how apparent the absurdity. I am glad to say a new light has recently dawned upon those who bring their money into the mining world, and unless the enterprise now offered be supported by favourable and uncontradictory evidence few, if any, speculators would be found to join in it. The best guarantee for the success of any enterprise in this country is that it is supported by men of standing and men of business, and on looking on the face of the Great North Tolgus Mine prospectus it will be evident to the most uninitiated that a number of merchants and gentlemen of means have stepped forward and identified the progress and success of this concern with that of their own business or profession. This is a sure proof that the commercial and monetary business of this mine will be conducted with the utmost care, economy, and efficiency; and if it can be shown that the basis upon which the undertaking rests is a proper one with respect to its finances, and that the properties of the ground with reference to its mineralogical and geological qualities may be relied on, then there will be no reason to doubt that it will prove an enterprise most worthy of public attention.

The capital of the company is 30,000*l.*, which is a sum quite sufficient for the necessary underground work, and to erect the necessary machinery for bringing this property into a highly productive state; and that it may be brought into a most profitable state, I have only to quote the notices of the highly-respected mining agents who have reported upon this mine below—for example Capt. Gilbert says, "West of the cross-cut, close to Derrick shaft, the lode was 3 feet wide, and a former company let it at 7*d.* in 1*l.*" Those who are acquainted with mining will have no difficulty in understanding what sort of a vein of copper this indicates, and to those who are not so well acquainted with copper mining a brief explanation will be sufficient to show the value of this formation of copper ore, and to account for the motives of the gentlemen we have alluded to in joining the direction. The statement of Capt. Gilbert means that the miners formerly received 7*d.* for breaking 20*s.* worth of copper ore, and as 7*d.* is about 1-34th part of a sovereign, every man in the party contracting to raise this ore in a bargain spoken of by Capt. Gilbert must have produced at the end of a month 34 times as much copper ore as was in value sufficient to pay for his labour. If we apply this question to businesses of other kinds connected with the rock, by a parity of reason we shall see the analogies; for instance, if the owner of a slate quarry were regularly breaking 34 times as much slate as would pay the labour cost, he would consider he had a good slate quarry; and if the proprietor of a colliery found his colliers breaking 34 times as much coal as would pay the cost of working and raising he would be satisfied. It amounts to this, that whereas a tributer on the North Downs lode in Great North Tolgus Mine would not have been content with less than 3*l.* or 4*l.* per month for his labour, each man contented with the bargain must have raised monthly, at the lower rate 102*l.*, and at the higher 136*l.* worth of copper ore to have made his wages, amounting to the proprietors in the first case 99*l.*, and in the second 132*l.* as clear gain upon the labour of one miner.

Those who have worked upon courses of copper ore know full well by what a rich lode the North Downs one must have been; and those who have been connected with the district will easily form an idea of the value of the mine that may be expected from these data at a future period of working. But strangers will enquire whether the formations of copper in this district are permanent as well as rich. If any person will take the trouble to look at the map of the Redruth district, at page 14 in Spargo's Statistics and Observations upon the Mines of Cornwall," &c., he will see the boundaries of 114 mines delineated; and if he were to follow up the history of every single mine for the last quarter of a century, he will find it one of not only unparalleled success, but in the Great North Tolgus there is an extraordinary circumstance that accounts for the great riches and of unprecedented riches. The first channel is the metalliferous rock forming the North Camborne copper lodes, in which are situate the celebrated Seton Mines, whose value and properties are too well known to require comment. The last dividend was 7*l.* per share, declared in June; and, on the whole, they amount to 353*l.* per share on 400 shares, profits divided every two months. This throws some little light on the value of the district, and shows, *en passant*, that the money required to open Great North Tolgus is a mere bagatelle in comparison with what may be expected in the shape of returns. We digress, but were going on to say that the second channel of rock is a transverse channel, striking the other channel at right angles at Great North Tolgus Mine. This is a meridional column of rock, and in it are situated all the Tolguses, the eastern part of Carn Brea, Wheal Buller, Penstruthal, Wheal Basset, and a host of other rich mines. If we look for a moment at the value of one of these mines, we shall have some idea of the character of the mineral deposits with which we are dealing. Take Wheal Buller, one of the youngest of the family group. In 1849 Wheal Buller gave dividends amounting to 256*0l.*; in 1850, 13,120*l.*; in 1851, 17,920*l.*; in 1852, 24,960*l.*; in 1853, 45,440*l.*; in 1854, 53,760*l.* Wheal Basset and other mines have produced, and are producing, similar riches from a comparatively trivial outlay. It is worthy of notice that Great North Tolgus is an entirely new and almost intact mine; the deepest workings are only about 15 fms. under the adit, which is 24 fms. under the surface, or nearly 40 fms. under the surface. Some of the mines of the district are of such magnitude that their steam-power is engaged pumping the water from sections of their lodes 200 or 300 fms. and more below the sea level. The junction of the north lode and Wheal Parent lode is still below the bottom of the engine-shaft, and will be seen by sinking. This meeting of lodes occurs only a few fathoms further down, but there is a grand junction of lodes some 70 fms. below the adit. It would now be too technical and voluminous an account to show all the mineral combinations and geological phenomena that will be met with in developing the great plan for fairly mining the Great North Tolgus grant; but in following up these enquiries there is an interesting treat for the student of nature, as well as a field from which the miners and capitalists may gather a rich harvest of gain. The shares are of 1*l.* each, deposit 5*s.*, with 2*s.* 6*d.* calls.

THE GREAT NORTH TOLGUS MINING COMPANY
(LIMITED).

Capital £30,000, in 30,000 shares of £1 each.

Deposit, 5*s.* per share; and the balance, if required, by calls of 2*s.* 6*d.* per share, of which 21 days' notice must be given for payment.

JOHN SHIMMIN, Esq., Islington-square, Liverpool (Chairman).

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BROKERS—Messrs. St. Alphonse and Halls, 75, Old Broad-street, London.

SOLICITOR—Frederick William Snell, Esq., George-street, Mansion House, City.

OFFICIAL AUDITOR—John Dunbar, Esq. (Public Accountant), 26, Moorgate-street, E.C.

SECRETARY—Mr. Thomas Spargo.

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This valuable mine is situate in the parish of Redruth, Cornwall, immediately adjoining to and surrounded by the richest dividend-paying mines in the county. Several rich lodes traverse the entire length of the property, and the great cross-course that has made such immense deposits of ore in Wheal Buller, Wheal Basset, South Frances, and other rich mines of the district, intersects the whole of the lodes in the sett.

The geological position of this mine is everything that can be desired, and the indications are exceedingly good; a lode of rich ore is opened upon in the bottom of the adit level, and it only requires a short time, with a moderate amount of capital, to bring it into a dividend-paying state.

Upwards of £8000 have already been expended upon the mine, in sinking shafts, driving levels, building houses, and erecting the necessary machinery for the practical development of the property, the whole of which has been purchased by the present company.

The mine has been inspected by some of the first agents in the county of Cornwall, the whole of whom concur in stating it to be a valuable property, and that the proposed capital is sufficient to bring it into a dividend state, whilst a reference to the annexed reports will more fully assert its intrinsic worth.

The operations at the mine will be prosecuted with all practicable speed, by the sinking of the flat-rod shaft upon the course of ore going down in the bottom of the adit level, and sinking the engine-shaft by nine men, so as to intersect the junction of Wheal Parent, north, caunter, and Denner lodes. (See plan and section.)

The peculiar advantages presented by this property are, that it is surrounded by rich mines. The railway passes near the property to the port of Portreath, which is not more than two miles distant. The shares in some of the mines in the same district having advanced to more than £400 premium in two months, it is fully expected within twelve months from present date that these shares will be selling also at a very high premium.

Prospectuses, with forms of application for shares, together with plans and sections of the mine, can be had on application at the offices of the company.

REPORTS.

The engine-shaft has began to sink below the adit; ground favourable for sinking, only 7*l.* 10*s.* per fm.—a beautiful killas, with veins of spar and prian in abundance. Wheal Parent lode is to be cut in the shaft at the 30. I should advise you to sink 15 fms. below the adit, then drive a cross-cut to prove the value of the lode: this lode in the adit is from 3 to 4 ft. wide—a very promising looking lode, composed of soft sugar-spar and quarts, mundic, prian, and good spots of yellow copper ore. The cross-cut is within 5 or 6 fms. to communicate to the engine-shaft. In the cross-cut driving under the engine-shaft there are small branches or veins, commonly called droppers or feeders of lodes; these branches contain copper, blende, and mundic, with beautiful prian; I should think there was another lode near by. The next lode south of Wheal Parent is Wheal Mary lode. In the adit level, as far as I have seen, this lode varies from 4 to 6 ft. wide, and is composed of spar, prian, blende, peach, mundic, and copper ore of good quality; this lode in the eastern mines has been one of the best lodes in all this district. Your agents informed me that it is their intention to cut down one of the adit shafts for a flat-rod shaft, and sink on the course of this splendid lode; you must expect this lode to do more for you than any other in the sett, as this is the main lode in the mine. At 40 or 50 fms. to the west of engine-shaft there is a small cross-course. In the neighbouring mines to the west there has been rich deposits of copper ore, which I firmly believe will be the case in this mine. From 30 to 40 fms. to the west of the above cross-course there is the great cross-course; to the west of this all the mines in this district have made the greatest part of their riches. The Old Tolgus, South Tolgus, the Great South Tolgus, East Basset, Copper Hill, and Wheal Buller made all their riches to the south of the above mine in similar stratum of killas. There is no doubt but this mine will prove equally as productive as those alluded to, if carried out properly. I would recommend you to commence operations on Wheal Mary lode at once, as this lode has proved the salvation of the mines to the east in the Old Wheal Mary, Treleigh, North Downs, Wheal Rose, and Halenbesgle Mines. This lode has been worked on four miles in length, and has been one of the best in the district. THOMAS DELBRIDGE.

Agreeably to your request, I have carefully inspected your most valuable property, and beg to hand you the particulars of the same. I descended from surface through a footway at a depth of 24 fms., which is the present adit; from thence I passed through a cross-cut north 6 fathoms, which brought me to North Downs, or Wheal Mary champion lode. From the appearance of this lode in the back, and more especially in the bottom of the level, there must certainly have been a great quantity of ores removed. In going east of the cross-cut the lode varies from 1 to 6 ft. wide a distance of 30 fathoms. West of cross-cut, close to Derrick shaft, the lode was 3 feet wide, and must certainly has been a large course of rich copper ore, as a former company let it at 7*d.* in 1*l.* This level is extended within 60 fathoms of the great cross-course which proved so productive throughout the whole of this important mining district. From Derrick shaft I again passed through a cross-cut north 12 fathoms, which intersected the engine lode. It is 18 in. wide, and laid open for about 30 fathoms. This lode at the present depth is highly mineralised throughout, producing good stones of copper ore, with blende and mundic. I would also remark, that further north two strong and masterly lodes exist, bearing the same promising appearance as those which I have laid before you, and as the underlie of the three north lodes must certainly form a junction about the 80, combined with the assistance of a beautiful elvan, and the large cross-course not far to the west, I hesitate not in saying that you have a most valuable property in the Great North Tolgus.

WILLIAM GILBERT.

The Great North Tolgus Mine is situated in the highly-productive district of Redruth, is bounded on the east by the old Wheal Mary and North Downs Mines, and on the west by the Setons, whose lodes pass through the sett. The sett is very extensive, being three-quarters of a mile upon the course of the lodes, of which there are three that have been worked upon by former parties at a shallow depth, and two upon which nothing has been done, with the exception of cross-cutting pits. An adit has been brought up from the eastern boundary, on the Wheal Mary lode, for 150 fms. in length, at which place a cross-cut is driven north to the Wheal Parent lode, proving them to a depth of 24 fms. from surface. Several tons of copper ore of good quality have been broken and sold from the back of the adit by the present company, and a good run of ore ground is gone down in the bottom of the adit, specimens from which are to be seen upon the mine. The stratum is all that can be desired, and the lodes are of a masterly character, and will, no doubt, make large quantities of ore in depth. The engine-shaft should be sunk by nine men, with the intention of intersecting the Wheal Parent lode at the 30; this shaft is now 17 fms. below the adit, and 41 fms. from surface, and, judging from the character of the lodes at the adit, you may fully expect some ore of value very shortly. An engine of 45-in. cylinder is erected, which is of sufficient power to prove the mine to a great depth. There is an account-house, smith's and carpenter's shop, store rooms, &c., and an efficient and well laid out plant. From the nature and character of the lodes, and the country in which they are imbedded, together with the rich locality in which the mine is situate, I think we are fully justified in expecting a great and lasting mine. JOHN DALE.

I send a transverse section and a rough surface plan of the Great North Tolgus. The former will serve to make plain my remarks in a previous letter, as regards the points of intersection of the lodes and elvan-course; the latter will give you some idea of the relative situation of the cross-courses, engine-shaft, &c., and their distances. There is one thing that I omitted in my last letter, and that is, the lode which rides the elvan, and on which ore has been raised at the adit level by a former company (I think Capt. Tregune), and indeed I did not know of its existence till very recently, but I find it has been driven upon at the adit level a few fathoms, where they had a bunch of ore; very little, however, had been done on it. You can easily see the character of this adventure, and I must confess it is a most kindly one. From the bottom of the flat-rod or footway shaft to the point of intersection is a most kindly piece of ground, and will do well, especially at and about that point. Old Treleigh made rich about the same elvan, and unquestionably on the same lode. There is ore now in the bottom of the flat-rod shaft, and they have had ore for some fathoms above it. No doubt as the elvan is neared the lode will improve, and at the junction of the two lodes and elvan the mine is likely to be very good. The engine-shaft will have to be sunk some fathoms before the lode will come into the shaft, after which I suppose they will sink on the course of it. There is a point (I mean the junction of Denner caunter and north lodes with Wheal Parent lodes) that will require time to reach, and after all may be of secondary consideration. You will see by the plan the piece of ground I alluded to in my last between the cross-courses. I call this part of the sett deserving attention more than any other—my reasons for so thinking I have already given. You have now every information that I can give, and I think you must agree with me that Great North Tolgus contains the elements of success, and cannot fail to be very rich. WM. BRENTON.

I have inspected this interesting property, and the following is my report:—I find a good and capacious engine-shaft sunk 41 fms. below the surface, being 17 fms. under the adit level, cased and divided, and ladder-road fixed to within 2 fms. of the present bottom, or as deep as the 15 fm. level. The ground in the shaft is comparatively easy, and such as nine men should sink 4 fms. per month through, and its character for the production of mineral in the lode is, to my mind, all that need be desired; indeed, its capability to produce and sustain mineral is manifestly observable at this moment, from the fact of there being a fissure or branch running obliquely through it, bearing good copper ore, which I consider of importance, as showing its mineral-bearing nature; and this circumstance strengthens the probability of Wheal Parent lode being found productive at or near the point of intersection by the cross-cut now being put out to cut it at the 15 fm. level, below the adit. I would further observe, in reference to the fissure or branch, that it falls in or forms with the lode at a short distance of the point of intersection by the cross-cut named above, and its coming in as it does from a north-westerly direction, considered in connection with other features presented in the stratum and lode, will, I believe, be found to have a most beneficial influence on the lode in question at the point named. It seems that by continuing to sink the shaft 13 fms. deeper, or to 30 fathoms under the adit, the Wheal Parent lode will fall into it, which, except the time that would be required for fixing the necessary pitwork, is a question of about four months' time. This circumstance is of great importance, and one which, I think, should be borne in mind while urging on the shaft by all exertion that can be brought to bear upon it; for if the lode be found productive, and to assist in paying the expenses of the mine at the 15, it will only be one point opened on the lode, and, therefore, large returns could not be expected; but as soon as the lode is reached at the 30, the mine on this lode would quickly be opened to a considerable extent, while the shaft should be continued on the course of the lode to deeper points. I have a good opinion of Wheal Parent lode being found productive from its appearance in the adit, in connection with other features, and I think the 15 cross-cut should be urged on as fast as possible, as with perseverance the lode may be reached in one month from this time, as the ground is good (price 90*s.* per fm.), and no hindrance need take place, nor should. The point at which the Wheal Parent lode forms a junction with the north lodes underlying south, although at some distance in time, being, it seems, some 70 fms. below the adit; but if the former lode be found productive, as I believe it will, it will be pleasant to look forward to the 70, where the junction will take place. The Wheal Mary lode is quite a separate part of the mine, being some 20 fathoms to the south of the engine-shaft, and the lode underlying south; consequently, it will ever be impracticable to work it from the engine-shaft. It is intended, therefore, to throw our rods from the engine to this shaft on the lode, and hence its name—viz., the flat-rod shaft. This shaft is cut down, timbered, and ready to receive the pitwork. There is a good lode in the bottom of the shaft, producing blocks of copper ore of a rich quality. I would urge upon the company the necessity of sinking the shafts with all the speed possible, as I am fully convinced that a short time will bring the property into a profitable state. R. WILLIAMS.

FORM OF APPLICATION FOR SHARES.

To be delivered entire either to the bankers or secretary of the company, accompanied by the amount of deposit.

To the Directors of the Great North Tolgus Mining Company (Limited).

GENTLEMEN,—Having paid to the sum of , being the amount of deposit of 5*s.* per share upon shares of £1 each in the Great North Tolgus Mining Company (Limited), I request you will allot me that number of shares, and I hereby agree to accept such shares, or any less number that you may appropriate me, subject to the regulations and Articles of Association of the said company.

Name in full .....
Occupation .....
Address in full .....
Usual signature .....

Dated day of , 1862.

DEPOSIT RECEIPT.

To be retained by applicant, and delivered up in exchange for share certificate.

Received of Mr. , on account of the Great North Tolgus Mining Company (Limited), the sum of £ , being the deposit of 5*s.* per share upon shares in the said company. For the Metropolitan and Provincial Bank,

£ : : .....

N.B.—All cheques to be crossed "Metropolitan Bank."

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1.—On the Geology of the Railway between Hyde and Marple. By J. TAYLOR, jun.
2.—On the North Staffordshire Coal Field. By JOHN BRADBURY, jun.
3.—On an Improved Safety-Cage for Miners. By T. FARRIMOND.

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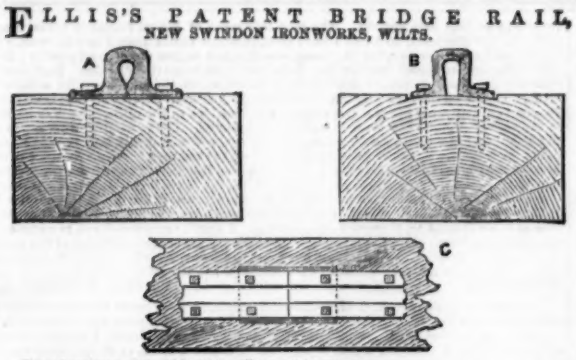

The advantages claimed by this rail over others are:—

1.—Its having a flat or solid surface its whole breadth to bolt down to the timbers (see section A).

2.—The impossibility of its collapsing, as is the case with all other bridge rails (see section B).

3.—Its being perfectly rigid. The bolts, therefore, remain firm in the timber till the rail is quite worn out.

4.—Its effecting a saving in the timbers of from 50 to 100 per cent., as there is no liability of the timbers being torn and splintered by their shifting, as is shown in section B, where the heads of the bolts are frequently torn off.

5.—Its shape admits of its being rolled at a less weight to the yard, without diminishing its strength or durability.

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The patent rail at 62 lbs. per yard is sufficiently strong to carry the heaviest engine on the Great Western Railway.

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3.—It occupies a very small space.

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5.—It raises with the water, and without the slightest injury to the apparatus, sand, mud, wood, stone, and every object of a smaller diameter than its tube.

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No. 5. Copper house shears, with 4 pulleys, 60 ft. long.
6. 8 arm cat head, deal axle, cast-iron centre piece.
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8. 250 fms. of 10 in. capstan rope at Copper-house shaft; 100 fms. 15 in. capstan rope in coal yard.
9. Boring machine.
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11. Powerful punching machine.
12. 2 boring bails and brace, 2 smiths' bellows.
13. 2 anvils.
14. 2 large vices.
15. 1 large faggot smiths' horse.
16. ditto ditto
17. 3 small ditto.
18. 1 skip and anvil.
19. New skip for 19 in. road.
20. Sundry flat iron.
21. 3 faggoted forge cranes.
22. Skip tool for making skips and kibbles.
23. 1 new shaft gig, wrought-iron, with 8 wheels, to run on skip road.
24. Smiths' tongs, large size.
25. Large bolt tools.
26. Swages, steel punches and clefts.
27. Swage anvils, swages and punches.
28. Small bolt tools.
29. Small smiths' tongs.
30. Swage anvils, to work sizes 1 inch to 8 inch.
31. Kibble mould.
32. Tram-road bolts.
33. Sundry square bolts.
34. Flange bolts.
35. Kibble expander.
36. Bur mandrils.
37. Large bugles.
38. Small bugles.
39. Boiler makers' sledges.
40. 2 faggoted rod plates.
41. Wood smiths' cranes and travellers, with 18 ft. lever.
42. Miners' mallets.
43. Miners' picks.
44. 7 large beams and scales, weigh from 1 cwt. to 1 ton, in good order.
45. Miners' sledges.
46. 5 in. flat iron.
47. 3 in. ditto.
48. 1½ in. round iron.
49. 1 in. round iron.
50. 2 in. best bar iron.
51. ⅝ square iron.
52. ⅞ borer steel.
53. Steel borers.
54. 1 4 ft. shieve.
55. 5 6 ft. shieves.
56. 4 shaft gigs.
57. 11 old whim kibbles.
58. 13 skips.
59. Bucket rods, 2 to 3 in., best iron.
60. 1 faggoted loop, 10 ft. long.
61. 1 ditto lever.
62. 4½ ft. cast crank.
63. Old cast-iron.
64. Old pinion.
65. Old cast axle.
66. 1 wood tram wagon.
67. Tram wagon complete.
68. Riddle.
69. 1 clack seat.
70. 1 drop clack.
71. Lot of treble faggoted couplings.
72. Rubbing bars.
73. 5 washing plates.
74. Faggoted joints and cheeks.

LOT.
75. 2 pair small yokes.
76. 2 pair 9 in. yokes.
77. 1 pair 12 in. ditto.
78. 1 pair 16 in. ditto.
79. 1 pair 19 in. ditto.
80. Faggoted coupling rings.
81. Faggoted pins.
82. Faggoted loops.
83. Fire-door and bars for a 12 ton boiler, with damper; rakes and bars for ditto.
84. Glands (best iron).
85. Double faggoted iron.
86. 4 cast whim cage arms.
87. Shaft door and iron.
88. Double faggoted pins.
89. 1½ in. flange bolts.
90. Wrought-iron levers.
91. 1 in. bolts for skip road.
92. Poppet head iron.
93. Staples and glands.
94. Furnace ladle.
95. Sundry bolts and staples.
96. Horse whim iron.
97. Shaft door iron.
98. Staples.
99. 5 large staples and glands.
100. 400 fms. tramroad iron.
101. Large candle chest.
102. Small ditto.
103. ½ cwt. gunpowder.
104. 86 coils fuse.
105. 2 copper bottom sieves.
106. 2 ditto ditto
107. 2 ditto ditto
108. 2 ditto ditto
109. 12 doz. shovel hilts.
110. Tray and riddle handles.
111. Nail chest.
112. 6 hand sieves.
113. 9 hand riddles.
114. Shovels.
115. Antifriction grease.
116. Oil and barrel.
117. Door and frame.
118. 12 brass bottom sieves, quite new, 4 hole.
119. 6 ditto ditto 6 hole.
120. 6 ditto ditto 8 hole.
121. 6 ditto ditto 8 hole.
122. 6 ditto ditto 8 hole.
123. Bundles of new laths.
124. 200 oak ladder staves.
125. ⅝ in. galvanised bottom riddles.
126. ⅞ in. ditto ditto
127. 10 ½ in. ditto ditto
128. 2 ⅜ in. ditto ditto
129. 12 ½ galvanised jigging bottoms.
130. 12 ⅞ ditto ditto
131. 12 ⅞ ditto ditto
132. 2 treble brass shieve blocks.
133. Old brass.
134. Bell wire.
135. Powder cans.
136. Leather.
137. Old brass jigging bottoms.
138. Old lead.
139. 4 sledges, 4 hand spikes.
140. Iron borings for making joints.
141. Pitch.
142. Oil cans.
143. New shovels, per lb.
144. Single, double, and treble blocks (large size).
145. 1 pair double blocks.
146. Small powder scales.
147. Steel chisels, and turning lathe tools
148. Winze rope.
149. Old cat head rope.
150. Rope.
151. White stuff rope.

ON FLOORS.

152. 14 in. 4 ft. matching piece.
153. 1 10 ft. 15 in. pole case.
154. 2 13 in. doorpieces.
155.
156. 1 12 ft. 13 in. working barrel.
157. 2 large steam pipes.
158. 1 11½ in. plunger pole, stuffing box and gland.
159. ¾ in. good chain (in yard).
160. 1 9 ft. 18 in. pump.
161. 1 9 ft. 21 in. pump.
162. 1 9 ft. 21 in. ditto.
163. 1 9 ft. 16 in. ditto.
164. 1 12 ft. 17 in. working barrel.
165. 1 13 ft. 18 in. new working barrel.
166. 1 13 ft. 15 in. working barrel.
167. 1 13 ft. 12 in. ditto.
168. 1 12 ft. 12 in. ditto.
169. 1 10 ft. 13 in. sinking windbore.
170. 1 9 ft. 12 in. ditto
171. 1 8 ft. 17 in. flat bottom windbore.
172. 1 6 ft. 20 in. ditto
173. 1 19 in. doorpiece.
174. 2 19 in. ditto
175. 1 13 in. ditto
176. 2 12 in. ditto
177. 1 19 in. H piece.
178. 1 13 in. ditto
179. 1 4 ft. 11 in. matching.
180. 1 3 ft. 13 in. ditto
181. 2 19 in. matchings.
182. 2 12 in. ditto
183. 2 19 in. clack seatings.
184. 1 connection piece.
185. 1 3 ft. shieve.
186. Angle bob iron.
187. 4 13 in. clack seatings.
188. 1 15 in. ditto
189. 1 18 in. ditto
190. 3 9 ft. 13 in. pumps.
191. 1 6 ft. 4½ in. pump.
192. 32 6 ft. 2½ in. pumps.
193. A large quantity of wrought scrap iron.
194. Old cast-iron.
195. 12 machine jigging hutches and sieves.
196. A quantity of whole balk.
197. ditto half timber.
198. ditto quarter timber.
199. ditto third timber & plank

The timber, about 100 lots, will be sold at the commencement of the sale, to begin precisely at Eleven o'clock.

The usual refreshments will be provided, and an omnibus will be at the Hayle station to take purchasers to the sale.

Shall only sell such articles of the office and account-house as can be conveniently parted with.

Any further information can be obtained of the agents on the mine; of Mr. JOHN BURGESS, Barncoose, Redruth, Cornwall; of Mr. JAMES HOLLOW, 1, Crown-court, Threadneedle-street, London; or DAVID COHEN, Esq., 5, Bank Chambers, Lothbury, London.

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	Destination.	Register.	Burthen.	To sail.
SHALIMAR	Melbourne and Auckland	1591	2750	Aug. 20.
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Accumulated fund exceeds	£500,000
Subscribed capital	447,180
Paid-up capital	137,000
Annual income from life premiums, upwards of	220,000

The new business is now progressing at the rate of more than £25,000 per annum.

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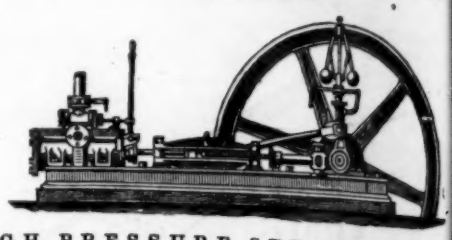

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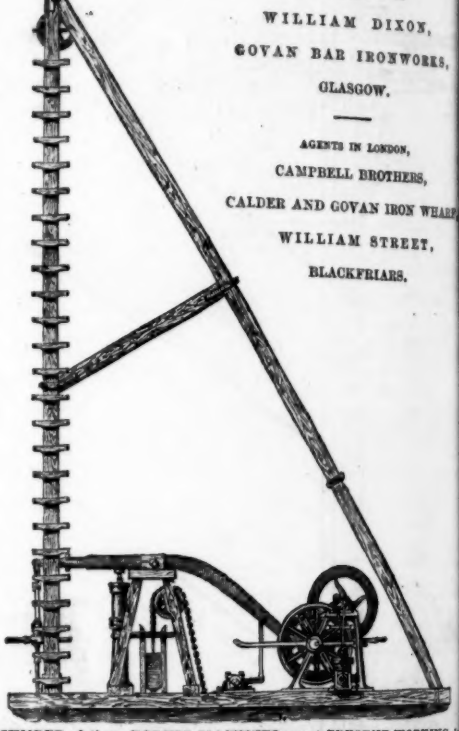

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